

### Claims

1. A thermally induced sound wave generating device comprising: a thermally conductive substrate; a heat insulation layer formed on one surface of the substrate; and a heating element thin film formed on the heat insulation layer and in the form of an electrically driven metal film, and wherein when thermal conductivity of the thermally conductive substrate is set as  $\alpha_s$  and its heat capacity is set as  $C_s$ , and thermal conductivity of the heat insulation layer is set as  $\alpha_i$  and its heat capacity is set as  $C_i$ , relation of  $1/100 \geq \alpha_i C_i / \alpha_s C_s$  and  $\alpha_s C_s \geq 100 \times 10^6$  is realized.
2. A thermally induced sound wave generating device according to claim 1, characterized in that the thermally conductive substrate consists of a semiconductor or metal.
3. A thermally induced sound wave generating device according to claim 1, characterized in that the thermally conductive substrate consists of a ceramics substrate.
4. A thermally induced sound wave generating device according to claim 1, characterized in that the heat insulation layer is a porous silicon layer that is formed on one surface of the thermally conductive substrate by making polycrystalline silicon porous.
5. A thermally induced sound wave generating device according to claim 4, characterized in that the porous silicon layer has silicon grains of a columnar structure at least in a part in the porous silicon layer.
6. A thermally induced sound wave generating device according to claim 4 or 5, characterized in that, in the porous silicon layer, dielectric films are formed

**on surfaces of nanocrystalline silicon.**

**7. A thermally induced sound wave generating device according to claim 6, characterized in that the dielectric films are oxide films.**

**8. A thermally induced sound wave generating device according to claim 6, characterized in that the dielectric films are nitride films.**

**9. A thermally induced sound wave generating device according to any one of claims 6 to 9, characterized in that the dielectric films are formed according to heat treatment.**

**10. A thermally induced sound wave generating device according to any one of claims 6 to 9, characterized in that the dielectric films are formed according to electrochemical treatment.**